

Order of Metals in Voltaic Circles 295:

current The current, which is constant is very feeble, and evidently related to the mutual position of the strong and weak solutions, and is probably due to their gradual mixture.

997. The results obtained by dilution of an electrolyte capable of acting on the metals employed to form with it a voltaic circuit may in some cases depend on making the acid a better electrolyte.

It would appear, and would be expected from the chemical theory, that whatever circumstance tends to make the fluid a more powerful chemical agent and a better electrolyte (the latter being a relation purely chemical and not one of contact), favours the production of a determinate current. Whatever the cause of the effect of dilution may be, the results still tend to show how valuable the voltaic circle will become as an investigator of the nature of chemical affinity (947).

^ vi. *Differences in the Order of the Metallic Elements of Voltaic Circles*

998. Another class of experimental arguments, bearing upon the great question of the origin of force in the voltaic battery, is supplied by a consideration of the different order in which the metals appear as electromotors when associated with different exciting electrolytes. The metals are usually arranged in a certain order; and it has been the habit to say that a metal in the list so arranged is negative to any one above it, and positive to any one beneath it, as if (and indeed upon the conviction that) they possessed a certain direct power one with another. But in 1812 Davy showed inversions of this order in the case of iron and copper¹ (678); and in 1828 De la Rive showed many inversions in different cases² (865); gave a strong contrast in the order of certain metals in strong and dilute nitric acid; and in objecting to Marianini's result most clearly says that any order must be considered in relation only to that liquid employed in the experiments from which the order is derived.⁴

999. I have pursued this subject in relation to several solutions, taking the precautions before referred to (905, etc.), and find that no such single order as that just referred to can be

maintained. Thus nickel is negative to
antimony and bismuth,
in strong nitric acid; it is positive to
antimony and bismuth in

¹ *Elements of Chemical Philosophy*, p. 149.
² *Annales de Chimie*, 1828. xxxvii. p. 232.
³ *Ibid.* p. 235. ⁴ *Ibid.* p. 243.